PROC. BIOL. SOC. WASH.
98(2), 1985, pp. 439–446

SPEONEBALIA CANNONI, N. GEN., N. SP., FROM THE CAICOS ISLANDS, THE FIRST HYPOGEAN LEPTOSTRACAN (NEBALIACEA: NEBALIIDAE)

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Abstract.—*Speonebalia cannoni* is described from two marine caves on Providenciales Island. It is characterized by the small rostrum, eyestalks without visual elements, mandible without incisor, maxilla 2 with very small exopod and unidivided endopod, and broad caudal ramus with densely setose margins.

A rich marine fauna has recently been found to inhabit marine caves in the Bahamas and associated islands. Cohen and Robins (1970) described a cavernicolous brotulid fish from a limestone sink near Nassau on New Providence Island. Yager (1981) discovered Remipedia, a new class of Crustacea, from a marine cave on Grand Bahama Island. Carpenter (1981) identified a new genus of troglobitic cirolanid isopod from a seawater-filled cave on San Salvador Island. From the same cave, Lighthouse Cave, Carpenter and Magniez (1982) reported a new isopod genus in the Gnathostenetroidoidea; Van Soest and Sass (1981) found three new species of sponges, and Barr (1984) described a new demersal calanoid copepod. From a cave in the Turks and Caicos Islands, Stock and Vermuelen (1982) identified a new genus of amphipod in the primarily abyssal family Pardaliscidae which also has a second species in the same genus inhabiting a lava tube cave on the Canary Islands. Buden and Felder (1977) have reported on the presence of cavernicolous shrimps in the Turks and Caicos. We describe herein a new genus and species of Nebaliacea (Phyllocarida: Leptostraca) collected during an expedition to marine caves in the Turks and Caicos Islands. This is the first known troglobite to be reported within the Leptostraca.

Nebaliidae Baird 1850, emend. Hessler 1984
Speonebalia, new genus

Diagnosis.—Blind, unpigmented. Carapace strongly compressed laterally, covering thoracopods and pleopods 1–5. Rostrum small, shorter than eyestalks, without carina. Eyestalks rather narrow, tapering distally; margins smooth.

Antenna 1 slightly shorter than antenna 2, about ⅔ length of carapace; last segment of peduncle without spines or teeth; scale narrow. Antenna 2 with 4-segmented peduncle.

Mandible without incisor; palp long, distal segment tapering, with several longitudinal rows of setae. Maxilla 2, distal (4th) endite of protopod well developed; endopod 1-segmented, with series of oval marginal organelles; exopod very small.

Thoracopods all similar, like those of *Nebalia,* with broad exopods and epipods having plumose marginal setae.

Pleopod 1 exopod without the usual dense row of short complex spines on lateral margin.

Caudal rami short and broad, margins densely setose, setae on medial margin very long.

Type-species.—*Speonebalia cannoni,* new species.

Etymology.—From the Greek "speos," cave, plus *Nebalia.*

Speonebalia cannoni, new species
Figs. 1–2

Material.—Turks and Caicos Islands, Caicos Islands, Providenciales Island: The Hole, 30 Oct 1982, leg. Thomas M. Iliffe, 11 paratypes, USNM 213480, from 5–7 m depths with suction bottle, using scuba. Airport Cave, 31 Oct 1982, leg. Thomas M. Iliffe, holotype, USNM 213478, and 14 paratypes, USNM 213479, from 10 m depths with suction bottle, free-diving.

Description.—Length from anterior end of rostrum to posterior end of caudal ramus 8–11 mm (holotype 10.4 mm). Carapace oval, about 1.7× as long as high, reaching posteriorly to pleonite 6, with angular posterodorsal corner below which posterior margin is armed with a series of close-set obtuse spines. Rostrum short, barely reaching beyond anterior margin of carapace, without keel, about ¾ as long as wide, narrowly rounded apically. Eyestalks narrowly pyriform, reaching beyond rostrum by about ⅖ of their lengths, completely lacking visual elements.

Antenna 1 much shorter than carapace, flagellum 13–19-segmented; scale about 6× longer than broad, with cluster of apical setae, longest 1.5× as long as scale, and row of setae on distal half of ventral surface. Antenna 2 slightly longer than antenna 1, segments 3 and 4 of peduncle not fused, armed with rows of long setae; flagellum 16–18-segmented, each segment with distomedial cluster containing long and short naked setae, seta with serrate section near midlength, and 1 or 2 esthetes (Fig. 1i, Table 1).

Mandible with incisor absent or possibly represented by low triangular process distal to molar; molar well developed, with granular oval chewing surface; 1st segment of palp short, unarmed; 2nd segment long, with long seta on anterior margin distal to midlength; 3rd segment slender, slightly shorter than 2nd, with row of long setae rising on medial surface and extending anteromedially and 2 rows of short setae on posterior margin, medial row perpendicular to axis of segment, lateral row directed obliquely distad. Maxilla 1 proximal endite with 12 setae having shape resembling hypodermic syringe, 1 slender distal seta and 1 seta on surface; distal endite with 9 stout spines, some bifid apically, and 2 longer setae distally; palp with cluster of 10 setae at level of endites and about 13 well separated setae along rest of shaft. Maxilla 2 with 4 well-developed densely setose endites, proximal endite about 2× as broad as subequal endites 2–4; endopod 1-segmented, about 3× as long as wide, with 6–7 setae on medial margin, 2 at apex, and 1 on lateral margin distal to midlength; anterior margin with 8–9 papillae having central canal leading to pyriform glands within endopod; exopod very small, about 0.2× as long as endopod, with 5–8 setae on anterior margin and apex.

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Fig. 1. *Speonebalia cannoni*: a, Habitus, lateral; b, Anterior body and carapace, dorsal; c, Rostrum and left eyestalk, lateral; d, Eyestalks, dorsal; e, Right antenna 1, dorsal; f, Antenna 1, segment 9 of

flagellum; g, Antenna 1 scale, ventral; h, Antenna 2 proximal segments, dorsal; i, Antenna 2 flagellum, setal cluster on segment 8; j, Labrum; k, Mandible; l, Maxilla 1; m, Maxilla 1, distal endite; n, Maxilla 2; o, Maxilla 2 endopod, lateral, showing glands; p, Pleonite 4, left lateral.

Table 1.—Composition of setal clusters on flagellum of antenna 2.

Segment	Short, naked	Long, naked	Serrate at midlength	Esthete
1	2	1	—	1
2	2	2	—	1
3	2	1	1	2
4	2	1	1	2
5	2	1	1	1
6	2	1	1	2
7	2	1	1	1
8	2	1	1	2
9	2	1	1	2
10	2	1	1	2
11	2	1	1	2
12	2	1	1	2
13	2	1	1	1
14	2	1	1	1
15	2	1	1	1
16—5 long terminal setae, 2 subterminal lateral setae				

Thoracopods all similar; endopod longer than exopod, curving laterad, with 4 segments distally, apical segment without marginal notches, medial margin densely setose; exopod lamellate, lateral and apical margins sparsely setose; epipod well developed, lamellate, with proximal and distal lobes, lateral and proximal margins sparsely setose.

Pleopods 1–4 with robust protopods having serrate posterior margins of lateral surface. Endopod longer and narrower than exopod, both margins setose, apex with long terminal spine lateral to which is shorter spiniform process; appendix interna with 2 retinacula. Exopod with setose medial margin; lateral margin armed with long spines and in pleopods 3 and 4 with plumose setae between each pair of spines except distal pair and sometimes proximal pair; apex with long spine. Pleopods 5 and 6 with setae on medial margin, apex, and distal part of lateral margin, those on medial margin shorter and more numerous in pleopod 5; apex with 2 long spines in pleopod 5, 3 in pleopod 6.

Pleonites 4–7 with serrate posterior margins; pleonite 4 with posteroventral corner produced into point; tergum of pleonite 8 (anal segment) incised posteriorly for about ⅓ length; sternum incised more broadly, with rounded shoulders laterally. Caudal ramus slightly longer than pleonites 7 and 8 combined, slightly more than 3× as long as wide; lateral margin armed with progressively longer spines; medial margin densely armed with very long plumose setae; apical spine about half as long as ramus.

We have been unable to determine the sex.

Etymology.—Named for H. Graham Cannon (1897–1963) in recognition of his outstanding contributions to our knowledge of the Nebaliacea (1927, 1931, 1960).

Comparisons.—Four genera of Nebaliidae are now recognized: *Nebalia* Leach, 1814; *Paranebalia* Claus, 1880; *Nebaliella* Thiele, 1904; *Dahlella* Hessler, 1984. The carapace of these genera is shorter than in *Speonebalia,* not reaching beyond pleonite 5. The rostrum is much larger than in *Speonebalia,* extending well beyond

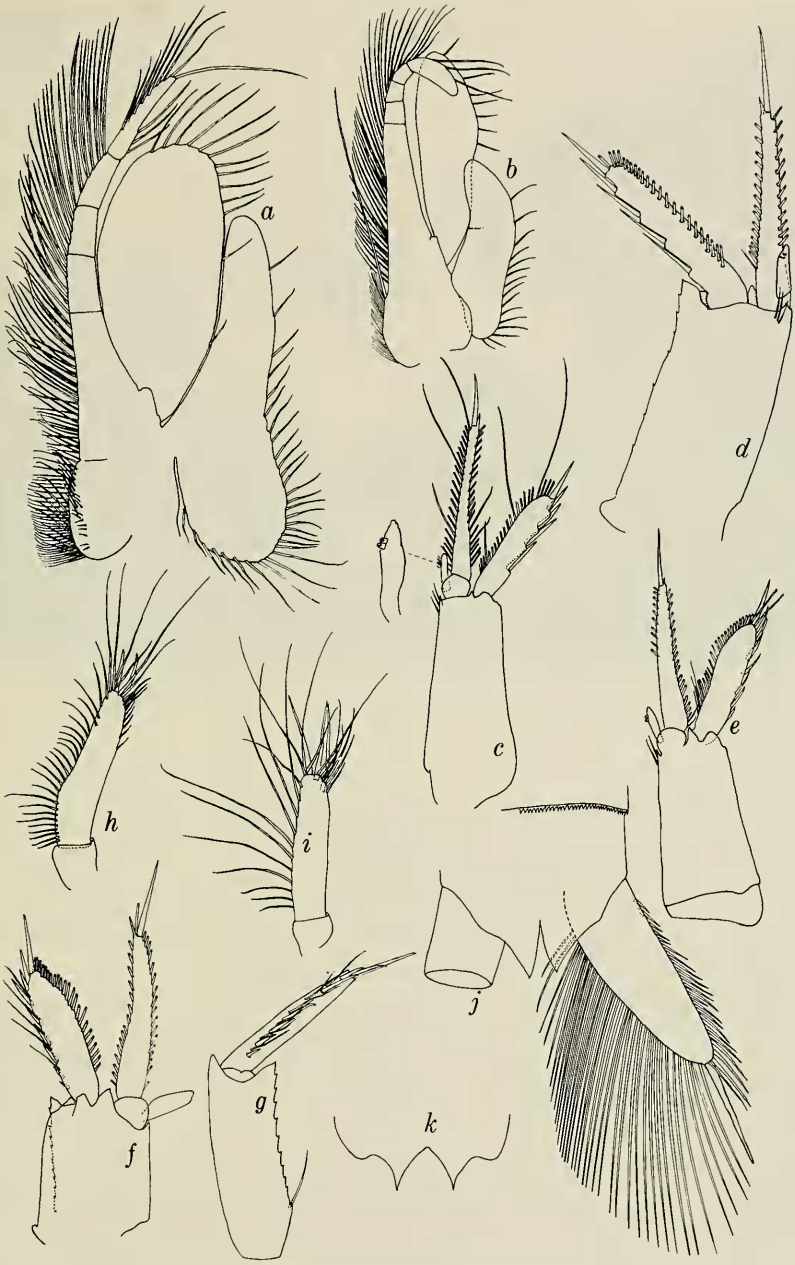

Fig. 2. *Speonebalia cannoni*: a, Thoracopod 1; b, Thoracopod 8; c, Left pleopod 1, anterior; d, Same, posterior; e, Left pleopod 2, anterior; f, Right pleopod 4, anterior; g, Same, lateral; h, Pleopod 5; i, Pleopod 6; j, Anal segment and uropod, dorsal; k, Posterior part of anal segment, ventral.

Fig. 3. Entrance to The Hole, Providenciales Island, aerial view. Photograph by Dennis Williams, November 1983.

the eyestalks in *Nebalia, Paranebalia,* and *Dahlella,* and the rostral carina present in *Paranebalia* and *Nebaliella,* is lacking in *Speonebalia.*

Antenna 2 is much longer than antenna 1 in *Nebalia, Paranebalia,* and *Nebaliella,* but only slightly longer in *Dahlella* and *Speonebalia.* The distal peduncular segment of antenna 1 has neither the armature of spines found in *Nebalia* nor the processes present in *Paranebalia* and *Nebaliella.*

The mandibular incisor, well developed in *Nebaliella,* is weakly developed in *Nebalia, Paranebalia,* and *Dahlella,* and absent in *Speonebalia.* The mandibular palp is unusually large in *Speonebalia,* reaching the distal segment of the peduncle of antenna 2; the 3rd segment is unusual in its slender tapering shape and its complex setal armament.

Maxilla 2 is the most distinctive appendage of *Speonebalia.* The 4th endite is well developed in *Nebalia* and *Paranebalia* as in *Speonebalia,* but reduced in *Nebaliella* and *Dahlella.* The 1-segmented endopod of *Speonebalia* is found in *Nebaliella* and *Nebaliopsis*; in *Nebalia, Paranebalia,* and *Dahlella* the endopod is 2-segmented. The glands in the endopod of *Speonebalia* have not been reported from any other Nebaliacean. Only in *Dahlella* is the exopod reduced as in *Speonebalia.*

In *Nebalia, Speonebalia,* and *Dahlella* the thoracopods have well developed endopods, exopods, and epipods. The epipods are absent in *Nebaliella* and much reduced in *Paranebalia.*

In all other genera of Nebaliidae the caudal rami are relatively slender. In *Speonebalia* the dense row of long setae along the medial margin presumably resists sinking and suggests a pelagic rather than a benthic life.

Habitat.—The Turks and Caicos Islands are a group of islands lying southeast of the Bahamas and north of Haiti. The basic geological and geomorphological setting is generally similar to that of the Bahama Islands (Gregor 1981). Providenciales Island is located on the northern edge of the Caicos Bank. The main topographical feature of the island is a line of hills 20 to 40 m above sea level running parallel to the coastline. These hills are formed from eolian carbonates, probably of Pleistocene age. Both The Hole and Airport Cave are situated within these hills.

The Hole is a shear-walled cenote-like pit about 15 m deep with a 15 m long by 10 m wide lake at the bottom, open to daylight (Fig. 3). This cave is located at the western end of Providenciales, 1.1 km from the nearest open water, the south coast. The 6 to 8 m deep lake is floored with breakdown and surface debris such that upon exploration of the lake with scuba, no human-sized cave passages were found extending off from it. *Speonebalia* specimens were collected from under a ledge in a dimly illuminated section of the lake. All specimens observed were swimming slowly about in the water column. Other species collected or observed in this lake include a new genus of ostracode in the family Thaumatocyprididae now being described by Louis Kornicker, a new genus of amphipod being studied by John Holsinger, a crab identified as *Sesarma* (*H.*) *miersii* Rathbun by C. W. Hart, Jr. and an uncollected copepod.

Airport Cave is located about 2.2 km inland from the north coast and 100 m north of the new airport terminal on the southern slope of Old Blue Hill. This cave was described by Buden and Felder (1977) as their collection site for the shrimp *Barbouria cubensis.* Airport Cave or one of several nearby caves may also be the nameless "waterhole" located northwest of the airfield which Stock and Vermeulen (1982) listed as the type-locality for the amphipod *Spelaeonicippe provo.* The cave consists of a nearly vertical collapse fissure in a large circular sink. A colony of bats, *Erophylla sezekorni sezekorni* (Gundlach), inhabits the cave, and their guano, dropping into the cave pool, has darkly stained the cave walls and sediments. The upper layer of the pool is anoxic as evidenced by a distinct hydrogen sulphide odor that was noted when the surface waters were disturbed. The visibility in the upper layers of the pool was somewhat reduced, but below about 2 to 3 m the water was very clear. *Speonebalia* specimens were observed to stay in loosely grouped clusters of up to 50 individuals. They were only found in the deeper waters of the pool in total darkness. Other animals observed in the pool include a new family of shrimps now being described by C. W. Hart, Jr. and Raymond Manning, and an amphipod of the same new genus as was found in The Hole. Several individuals of a new species of Remipedia were collected by Jill Yager from Airport Cave during a later visit in April 1983. Contrary to Buden and Felder's (1977) observations, no *Barbouria cubensis* were observed, nor did we find any *Spelaeonicippe provo* that Stock and Vermeulen (1982) had collected here.

During the April 1983 expedition, water salinity in Airport Cave was measured, with the following results: surface, 19.1‰; 3 m, 19.1‰; 5 m, 26.5‰; 7 m, 28.7‰. Temperature was 23.1°C at the surface and 25.6°C at 5 m.

Acknowledgments

Collection of specimens from caves in the Turks and Caicos Islands was supported in part by a National Science Foundation Grant (BSR 8215672) to Thomas

M. Iliffe. We especially thank Paul and Shirley Hobbs for arranging accommodations and helping us with cave location and collections, and Dennis Williams for flying us to various islands as well as assisting with field collections. Field expenses for the April 1983 expedition were supported by NSF Grant BSR 8212335. Howard Cosgrove assisted in field collecting and water analysis. We are grateful to Erik Dahl and Robert R. Hessler for helpful comments on the manuscript.

All research divers were cave divers certified by the National Speleological Cave Diving Section. This paper is contribution No. 990 from the Bermuda Biological Station for Research, Inc.

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